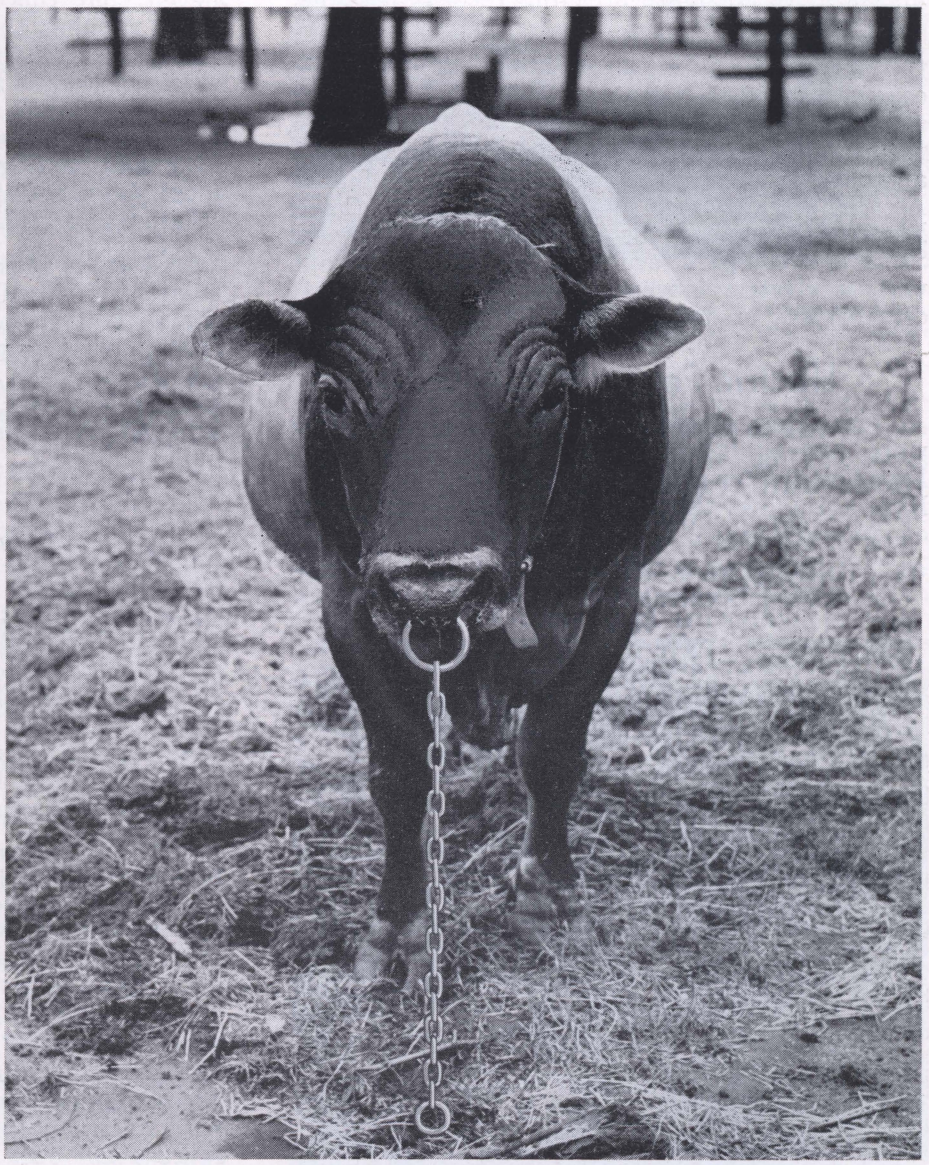
MP-239 August 1957

A PART OF THE TEXAS A&M COLLEGE SYSTEM

• Electrified Fences for Bull Pens



TEXAS AGRICULTURAL EXPERIMENT STATION
R. D. LEWIS, DIRECTOR, COLLEGE STATION, TEXAS

Electrified Fences for Bull Pens

R. E. LEIGHTON, M. A. BROWN and R. C. JASKA*

DAIRY HERD SIRES IN TEXAS number over 30,000 animals. Effectively penning these usually docile, yet occasionally vicious animals, provides increased safety for the farmer and his family. In addition it extends the service life of the bull and makes more adequate breeding records possible.

Most classes of farm livestock have been effectively confined to pastures or pens through the careful use of electric fences. A dairy bull with a relatively thick skin and in some cases, horns, together with a natural inclination to rub, scratch and butt, provides a severe test for electric fences. A study was initiated in 1953 at the Dairy Cattle Breeding Center, Texas Agricultural Experiment Station, to compare several types of insulators and various electric fence installations for the safe confinement of dairy herd sires.

Electric Fence Installations

The types of electric fence installations that were evolved through use at the Dairy Cattle Breeding Center are shown in Figures 1, 2 and 3. Figure 1 shows the use of horizontal arms made of creosoted pine 2 x 4's, 24 inches long, nailed to creosoted fence posts with insulators nailed near the ends and on top of the arms. The lower wire had a short section of spiked chain which hung beneath the arm and connected to the electrified wire on either side of the insulator. It was believed that this chain might prevent the bulls from rubbing their heads under the horizontal arms to knock them loose. In practice, however, even when bulls accidentally contacted this lower wire the chains soon were wrapped around the arms which exposed the arms to attacks of rubbing and butting. This installation required almost daily maintenance to replace loosened insulators and to untangle the short pieces of chains.

*Respectively, professor and assistant professor, Department of Dairy Science; and assistant professor, Department of Agricultural Engineering, Texas Agricultural Experiment Station, College Station, Texas.

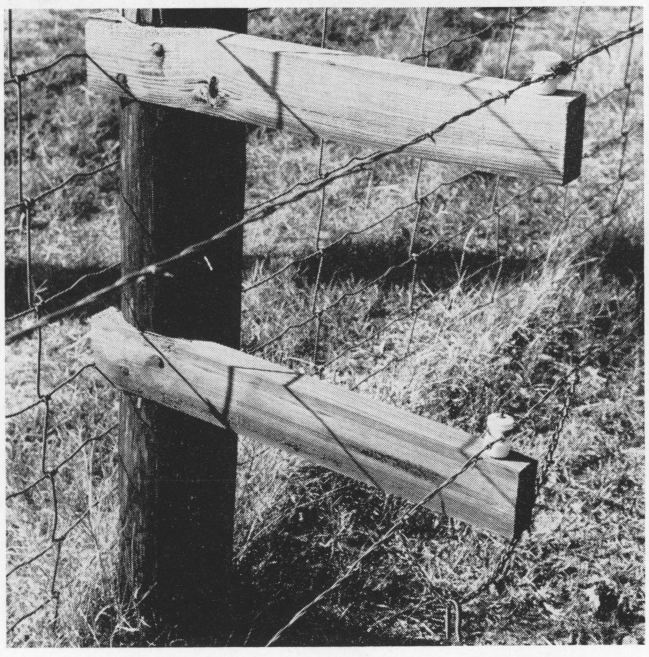


Figure 1. First type of installation tested. The chain and staples on the lower wire failed to prevent some of the bulls from breaking the arm.

Figure 2 illustrates the second type; the insulators were nailed to the ends of the 2 x 4-inch arms. This installation was slightly superior to that shown in Figure 1 yet there was still a problem of excessive maintenance. Again the chains became wrapped around the wire, insulator and arm, which exposed the arms to attacks by the bulls.

A third type of installation involved the use of a 2-foot section of 2 x 4-inch creosoted pine nailed vertically on each fence post with the insulators nailed horizontally into the 2 x 4 near either end. "Hot" wires were attached to these insulators. The 2 x 4's were nailed to the post at a height that placed the bottom wire about 12 to 15 inches from the ground. This installation required much less maintenance than either of the first installations. There was less tendency for insulators to be knocked loose and 2 x 4's were not loosened from the posts.

The fourth arrangement, Figure 3, was similar to the third installation except that a ground wire was added to provide a greater chance for shocking the bulls, particularly when the soil was dry. A 3-foot section of 2 x 4 was nailed vertically on each fence post. Two insulators nailed to the 2 x 4 (12 inches and 36 inches from the ground) carried the "hot" wires. The grounded wire was located equidistant between the two electrified wires. Maintenance was reduced to a minimum with this type of installation. A check of this fence about once a week was sufficient to maintain a "hot" fence. There was less tendency for insulators to get knocked loose because of a better chance for a shocking contact with the wires.

Barbed wire was used to carry electrical current in all four types of fence installations. Barbs appear to make better contact with the bull's skin than does smooth wire. A 12-inch section of chain fastened to the bull's nose ring (cover photo-

TABLE 1. RANK OF INSULATORS IN ORDER OF RESISTANCE (LOWEST CURRENT LOSS)

	WP23E	Wisp 3	WP5E	WP22E	Weather
May 13, 1953	1	2	3	4	Dry
Sept. 8, 1953	1	2	3	4	Dry
Sept. 22, 1953	1	3	2	4	Dry
Oct. 27, 1953	2	1	3	4	Damp
Jan. 18, 1954	3	1	4	2	Very damp
Jan. 16, 1954	2	1	4	3	Damp
Average rank	1	1	3	4	

graph) also helps to insure a "hot" contact with the electric fence if the bull should be inclined to rub against it. The fourth plan, Figure 3, which uses the grounded wire makes maximum use of the nose chain because when the bull's nose touches either wire, the chain is likely to contact either another wire or the soil.

Relative Efficiency of Insulators

Four types of porcelain insulators were used to study their relative efficiency as measured by current loss, particularly in damp weather, Figure 4.

In this study 12 bull pens were divided into four groups of three pens each. All line insulators in each group were of the same type. Assuming that any leakage of current through the insulators would result in a reduction in the amount of resistance in the circuit, periodic tests of resistance were made, using the ohmmeter.

The rankings given these insulators on 6 test days during both wet and dry weather are shown in Table 1. The highest rank is given to the insulator showing the most resistance and, therefore, the smallest amount of leakage. The Wisp 3 insulator apparently was superior in resistance to the other insulators, particularly during damp weather. Wisp 3 probably showed greater resistance because the nailhead was not exposed at the outer end of the insulator. This insulator was too fragile to be used on bull pens and its use had to be abandoned. The breakage occurred in the porcelain threads inside the insulator which fastened the insulator to the nailhead. The multigroove insulator WP23E is recommended for use on bull fences. It ranked close to the Wisp in resistance and proved equal to any of the other insulators in breakage and maintenance.

The plastic Red Snap'r insulator, Figure 4, failed to hold the wire in the manner for which it was designed; it was not tested for resistance. This insulator probably is satisfactory for ordinary electric fencing but apparently is not adapted to bull pens.

Overhead Versus Underground Leadout Wires

Two commercial brands of insulated wire designed for underground use were studied, Figure 5. The insulated wires were used to carry current

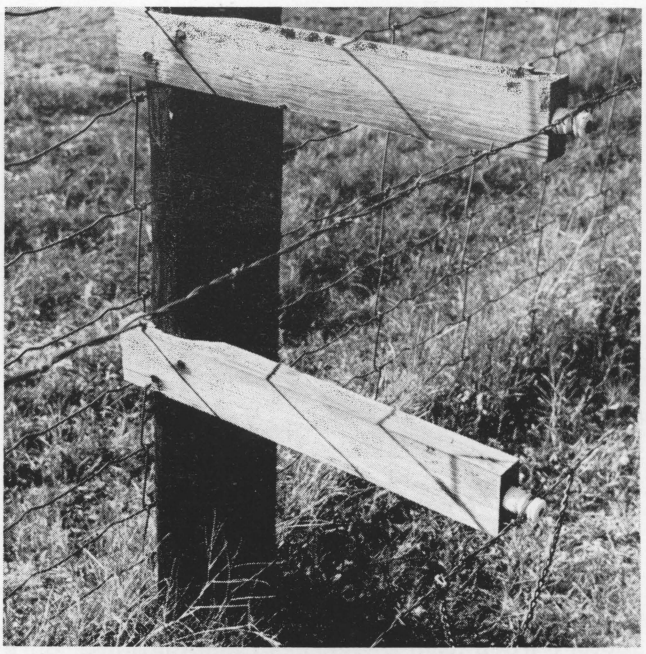


Figure 2. Second type of installation used in the tests. Because of the location of the insulators, less arm breakage occurred with this installation than with the installation shown in Figure 1.

from the fence chargers to the wires in the bull pens. The underground wires were unsatisfactory in the unstable subsoil at this location. The wires were broken or they shorted out rather quickly after installation. An overhead insulated wire was more satisfactory for this area. The same brands of insulated wire that were unsatisfactory when used underground were completely satis-

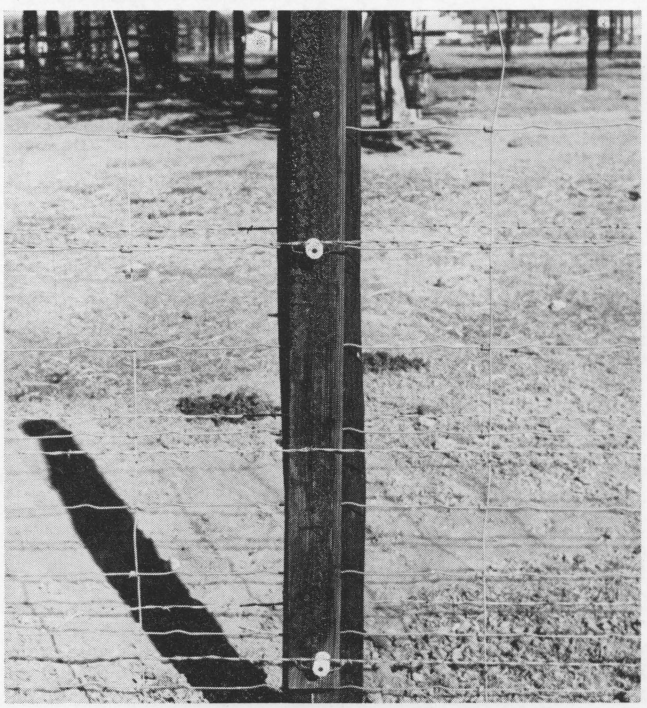


Figure 3. Fourth and most satisfactory installation tested. Except for the center ground wire this installation was similar to the third installation tried.

Figure 4. Insulators tested for durability and current leakage. Left to right: WP23E (multigroove), WP22E (multigroove), WP5E, Red Snap'r (not checked for leakage) and Wisp 3. The double-headed nail illustrated tended to reduce breakage at time of installation. The special screwcap nail used with the Wisp 3 is shown below that insulator.

factory when used as overhead installations. Both types of wire apparently have been used successfully in other localities by other workers. Newly developed types of underground feeder wires may prove satisfactory even under the conditions of this test.

Protection of Shade Trees in Bull Pens

The protection of shade trees in bull paddocks is an old problem. Trees in bull pens apparently die because the bulls rub against the trunks, causing gradual erosion of the bark. Figure 6 illustrates one method that has successfully protected the trees against rubbing. Even during the last 3 years when many trees were dying because of the drouth tree losses in the bull paddocks have not been serious. Only two nails were driven through each 2 x 4 to hold it to the tree. The barbed wire was wrapped rather loosely around the boards and fastened with staples. In 3 years of use it has not been necessary to loosen the wires to allow for growth of the trees.

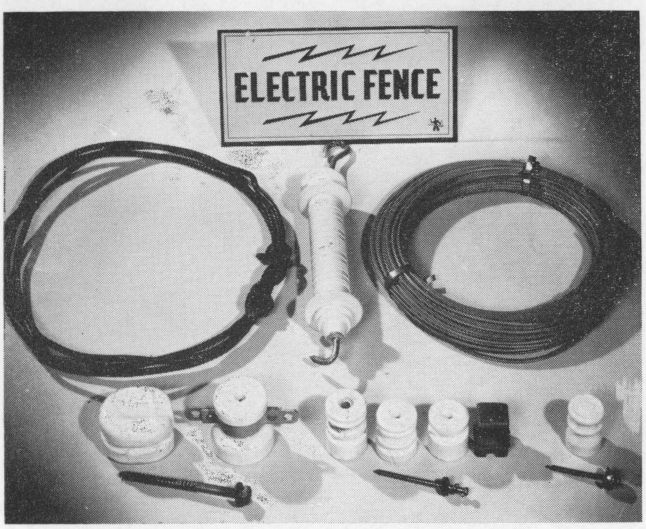


Figure 5. Electric fence equipment used in the tests. TOP: warning sign. MIDDLE, left: General Electric U. F. underground feeder cable; center: enclosed-spring gate hook; right: hythene underground wire. BOTTOM, left to right: corner insulator, gate anchor and line insulators identified in Figure 4. The lag screw shown at lower left was used to attach the gate anchors to the posts.

Figure 6. Protective device that has prevented bulls from rubbing against the trees in their pens.

Cover Picture

The Jersey bull shown is Masterman Daunt, 487638, whose daughters in the Texas A&M College Dairy herd have given him the following daughter-dam comparison:

	Milk, pounds	Fat, percent	Fat, pounds
6 daughters averaged	9929	5.5	543
6 dams averaged	7265	5.3	387
Difference	+2664	+0.2	+156

Daunt was bred by Knolle Jersey Farms, Sandia, Texas.

Acknowledgments

The porcelain insulators and the hythene wire were supplied for this research by the Accessories Manufacturing Co., Inc., Kansas City, Missouri. The Parmak Vita-valve fence chargers were furnished by the Parker McCrory Manufacturing Co., Kansas City, Missouri, and the Red Snap'r insulator by North Central Plastics, Inc., Ellendale, Minnesota.

The authors acknowledge also the valuable assistance of Dr. I. W. Rupel, head, Department of Dairy Science, Texas A&M College System.